PEARSON EDEXCEL GCSE CHEMISTRY · 1CH0

CHEMISTRY



EXAM QUESTION PACK

TOPIC 9: SEPARATE CHEMISTRY 2 (PACK 1)

SCORE	PERCENTAGE
/120	%

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Q1.

Describe how the technician should carry out a flame test on a solid.

(2)

.....

.....

.....

.....

Q2.

(i) Complete the sentence by putting a cross (☒) in the box next to your answer.

The colour produced in a flame test by calcium ions is

(1)

☒ **A** green

☒ **B** lilac

☒ **C** orange-red

☒ **D** yellow

(ii) Describe how a flame test is carried out on a solid.

(2)

.....

.....

.....

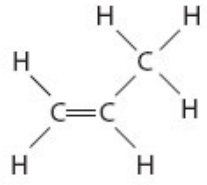
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Q3.

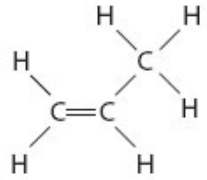
(i) Which of the following is the formula for a molecule of ethane?

Put a cross (☒) in the box next to your answer.

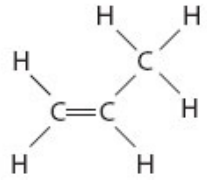
(1)



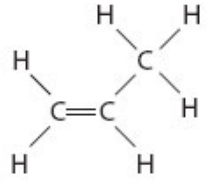
A CH_4



B C_2H_4



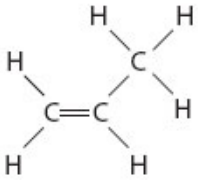
C C_2H_6



D C_6H_8

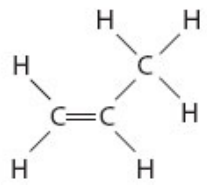
(ii) Complete the sentence by putting a cross (☒) in the box next to your answer.

The structure of a molecule of a substance is shown.

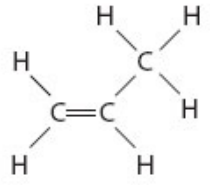


The substance is

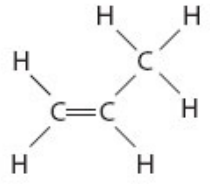
(1)



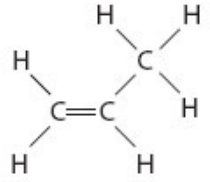
A ethene



B propane



C propene



D butane

Q4.

Substance **X** is an ammonium salt.

(i) Complete the sentence by putting a cross (☒) in the box next to your answer.

A test was carried out to find which anion is present in substance **X**.
Dilute hydrochloric acid was added to a sample of substance **X**.
There was effervescence and the gas given off turned limewater milky.

The anion present in substance **X**is

(1)

☒ **A** carbonate ion, CO_3^{2-}

☒ **B** chloride ion, Cl^-

☒ **C** nitrate ion, NO_3^-

☒ **D** sulfate ion, SO_4^{2-}

(ii) Describe how sodium hydroxide solution can be used to show that ammonium ions are present in substance **X**.

(2)

.....

.....

.....

.....

.....

Q5.

Propane, C_3H_8, and butane, C_4H_{10}, are members of the same homologous series, called the alkanes.

(i) Explain why both propane and butane are alkanes.

(2)

.....

.....

.....

(ii) Draw the structure of a molecule of butane, C_4H_{10}, showing all covalent bonds.

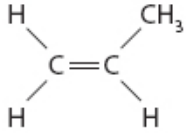
(2)

Q6.

(a) The table shows information about two alkenes.

Complete the table to show the names and structures of these alkenes.

(2)

name	structure of a molecule
ethene	
	

(b) (i) Ethene is an unsaturated compound.

State what is meant by **unsaturated**.

(1)

.....

(ii) Describe what is **seen** when ethene is passed into bromine water.

(2)

.....

.....

.....

(c) Alkenes can be obtained by cracking some fractions obtained from crude oil.

Explain what is meant by **cracking**.

(2)

.....

.....

.....

(d) (i) Complete the sentence by putting a cross (☒) in the box next to your answer.

Molecules of ethene are reacted together to form poly(ethene).
The reaction taking place is

(1)

☒ **A** combustion

☒ **B** photosynthesis

☒ **C** decomposition

☒ **D** polymerisation

(ii) Poly(ethene) is used to make plastic carrier bags.
Many of these bags are put into landfill sites.

Explain why the presence of waste plastic in landfill sites causes problems.

(2)

.....

.....

.....

.....

.....

(Total for Question = 10 marks)

Q7.

Qualitative tests are carried out on ionic substances to identify the ions present in the substances.

The test for a given ion must be unique to that ion.

(i) Explain why the test for a given ion must be unique to that ion.

(2)

.....

.....

.....

.....

(ii) In the test for the carbonate ion, CO_3^{2-}, dilute hydrochloric acid is added to the solid being tested.

State the name of the gas produced in the test if carbonate ions are present.

(1)

.....

(iii) Tests for three ions are described.

Draw one straight line from the test for each ion to the observation that shows that ion to be present.
Each observation may be correct for one test, more than one test, or for none of the tests.

(3)

description of test	observation
test for chloride ion: add dilute nitric acid followed by silver nitrate solution	green precipitate
test for iodide ion: add dilute nitric acid followed by silver nitrate solution	red precipitate
test for sulfate ion: add dilute hydrochloric acid followed by barium chloride solution	white precipitate
	yellow precipitate

(Total for question = 6 marks)

Q8.

Qualitative tests are used to identify ions in compounds.

Instrumental methods are often used for analysis.

Give a reason why instrumental analysis may be better than other methods of analysis.

(1)

.....

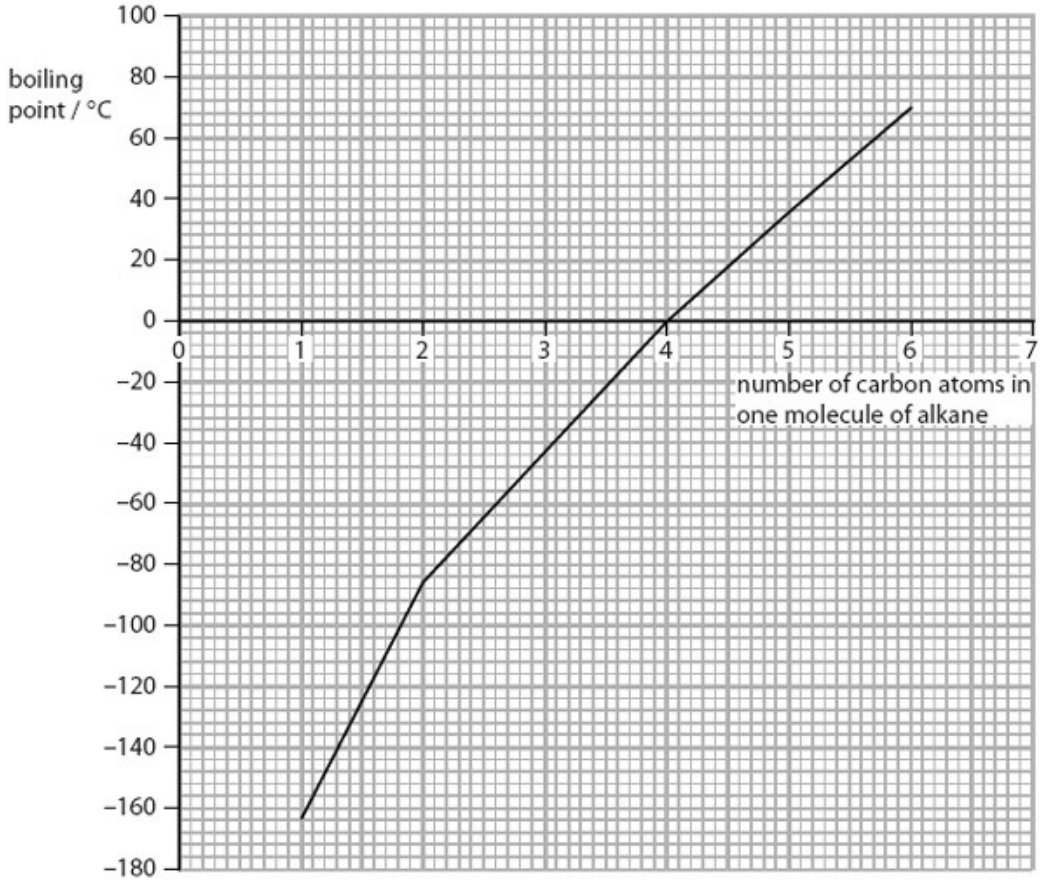
.....

(Total for question = 1 mark)

Q9.

The graph shows the boiling points of some alkanes.

The boiling point of each alkane is plotted against the number of carbon atoms in one molecule of the alkane.



(i) A molecule of pentane contains five carbon atoms.
Use the graph to suggest the boiling point of pentane.

(1)

boiling point of pentane = ... °C

(ii) State how the boiling points of these alkanes change as the number of carbon atoms in one molecule of each alkane increases.

(1)

.....

Q10.

Butene is an alkene.

(i) Which row in the table describes the structure of alkenes?

(1)

	hydrocarbon	unsaturated
☒ A	yes	no
☒ B	no	yes
☒ C	yes	yes
☒ D	no	no

(ii) Butene gas is bubbled into orange coloured bromine water.

The liquid

(1)

☒ **A** remains orange

☒ **B** remains colourless

☒ **C** changes from clear to orange

☒ **D** changes from orange to colourless

(Total for question = 2 marks)

Q11.

In industry sodium carbonate is made from sodium chloride solution and calcium carbonate in the Solvay Process.

Describe the test to show that calcium carbonate contains carbonate ions.

(3)

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.....

Q12.

(a) Calcium nitrate solution reacts with sodium carbonate solution.
The products are calcium carbonate and another salt.

Write the word equation for this reaction.

(2)

.....

.....

(b) (i) Complete the sentence by putting a cross (☒) in the box next to your answer.

The colour produced in a flame test by calcium ions is

(1)

☒ **A** green

☒ **B** lilac

☒ **C** orange-red

☒ **D** yellow

(ii) Describe how a flame test is carried out on a solid.

(2)

.....

.....

.....

.....

(c) If calcium carbonate is heated strongly, it decomposes.

$$CaCO_3 \rightarrow CaO + CO_2$$

If 100 g of calcium carbonate is heated a calculation shows that 44 g carbon dioxide should be formed.

(i) In an experiment 100 g of calcium carbonate was heated and only 40 g carbon dioxide was formed.

Calculate the percentage yield of carbon dioxide in this reaction.

(2)

.....

.....

percentage yield of carbon dioxide =.....%

(ii) Suggest a reason why only 40 g of carbon dioxide was formed in the experiment.

(1)

.....

.....

.....

(d) Complete the sentence by putting a cross (☒) in the box next to your answer.

Ionic compounds

(1)

☒ **A** conduct electricity when solid

☒ **B** do not conduct electricity when molten

☒ **C** have low boiling points

☒ **D** have high melting points

(Total for Question = 9 marks)

Q13.

Figure 16 shows the structure of a molecule of dichloroethene.

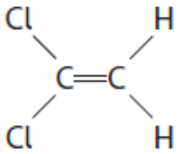


Figure 16

An industrial process uses 500 tonnes of dichloroethene.
In the process only 96.5% of the dichloroethene molecules react.

Calculate the mass of dichloroethene that has **not** reacted.

Give your answer to two significant figures.

(3)

.....

.....

.....

.....

mass = ... tonnes

(Total for question = 3 marks)

Q14.

Calculate the relative formula mass of ethanol, C_2H_5OH.

(relative atomic masses: H = 1, C = 12, O = 16)

(2)

relative formula mass = ...

(Total for question = 2 marks)

Q15.

Figure 2 shows the structure of a molecule of dichloroethene.

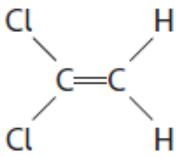


Figure 2

An industrial process uses 500 tonnes of dichloroethene.
In the process only 96.5% of the dichloroethene molecules react.

Calculate the mass of dichloroethene that has **not** reacted.

Give your answer to two significant figures.

(3)

.....

.....

.....

mass = ... tonnes

(Total for question = 3 marks)

Q16.

The balanced equation for the production of ethanol from the carbohydrate sucrose is

$$\underset{\text{sucrose}}{C_{12}H_{22}O_{11}} + H_2O \rightarrow 4C_2H_5OH + 4CO_2$$

Calculate the minimum mass of sucrose needed to produce 26.9 g of ethanol.

(relative formula masses: $C_2H_5OH = 46$, $C_{12}H_{22}O_{11} = 342$)

(2)

.....

.....

.....

.....

minimum mass of sucrose = ... g

(Total for question = 2 marks)

Q17.

Polymer molecules can be made by joining together large numbers of small molecules called monomers.

Calculate the relative formula mass of the poly(propene) molecule made from joining together 24 600 molecules of propene, C_3H_6.
(relative formula mass: C_3H_6 = 42.0)

Give your answer to three significant figures.

(2)

.....

.....

.....

relative formula mass = ...

(Total for question = 2 marks)

Q18.

(a) Which of these is the formula of a molecule of a hydrocarbon?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** CH_3COOCH_3

☒ **B** CH_3CH_2Cl

☒ **C** CH_3CH_3

☒ **D** CH_3COOH

(b) The formula of a molecule of propene is C_3H_6.

Draw the structure of a molecule of propene, showing all covalent bonds.

(2)

(c) Methane burns in oxygen to form carbon dioxide and water.
Write the balanced equation for this reaction.

(3)

.....

*(d) Natural gas is mainly methane.
A gas with similar composition, known as bio-methane, can be produced from plants grown specifically for this purpose.

Describe the advantages and disadvantages of using bio-methane rather than natural gas as a source of energy.

(6)

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(Total for Question is = marks)

Q19.

Figure 1 shows a mug made of clay ceramic.

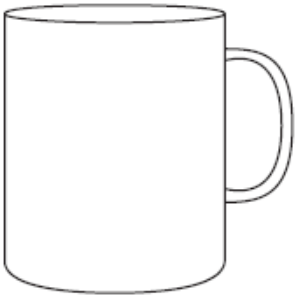


Figure 1

Which property of clay ceramic makes it suitable for use as a mug?

(1)

- ☒ **A** is brittle
- ☒ **B** is not transparent
- ☒ **C** does not conduct electricity
- ☒ **D** does not dissolve in water

(Total for question = 1 mark)

Q20.

Write the balanced equation for the combustion of methane, CH_4, in oxygen to form carbon dioxide and water.

(3)

.....

Q21.

This question is about properties of materials.

Figure 6 shows some properties of steel and Kevlar®.

property	steel	Kevlar®
density / g cm^{-3}	7.85	1.44
relative strength	1	5
flexibility	low	high
resistance to corrosion	low	high

Figure 6

Body armour, such as a bullet-proof vest, could be manufactured using either of these materials.

Explain **two** reasons why Kevlar® is preferred to steel as the material for body armour.

(4)

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.....

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.....

.....

(Total for question = 4 marks)

Q22.

Alkenes burn completely to produce carbon dioxide and water.

Balance the equation for the complete combustion of butene gas, C_4H_8.

(1)

C_4H_8 + ... O_2 → ..... CO_2 + ... H_2O

(Total for question = 1 mark)

Q23.

Figure 5 shows some information about the alkenes, ethene and propene.

Complete the table. The structure of propene must show all covalent bonds.

(2)

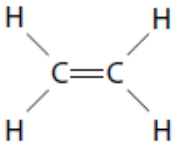
name of alkene	molecular formula	structure
ethene		
propene	C_3H_6	

Figure 5

(Total for question = 2 marks)

Q24.

Figure 14 shows some information about the alkenes, ethene and propene.

Complete the table. The structure of propene must show all covalent bonds.

(2)

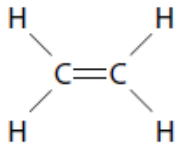
name of alkene	molecular formula	structure
ethene		
propene	C_3H_6	

Figure 14

(Total for question = 2 marks)

Q25.

Two tests were carried out on copper sulfate solution.

(i) Sodium hydroxide solution was added to a small amount of copper sulfate solution.
A blue precipitate of copper hydroxide formed.

Complete the word equation for the reaction.
Include state symbols.

(2)

copper sulfate (aq) + sodium hydroxide (aq) → ..... (.....) + ... (.....)

(ii) Dilute hydrochloric acid was added to a different sample of copper sulfate solution. Barium chloride solution was then added.

State what would be **seen**.

(1)

.....

(Total for question = 3 marks)

Q26.

Iron(III) ions, Fe^{3+}, react with hydroxide ions in solution to form iron(III) hydroxide.

Complete the ionic equation for this reaction.

(1)

$Fe^{3+} + 3OH^- \rightarrow$ .....

(Total for question = 1 mark)

Q27.

Alcohols can be dehydrated.

Complete the balanced equation for the dehydration of butan-1-ol by drawing the structures of the two products in the boxes. Name the two products.

(3)



butan-1-ol → ..... +
.....

(Total for question = 3 marks)

Q28.

Figure 2 shows the structure of a molecule of dichloroethene.

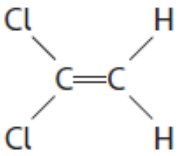


Figure 2

Dichloroethene is produced from ethene and chlorine.

In the overall reaction, ethene reacts with chlorine and forms dichloroethene and hydrogen chloride.

Complete the balanced equation for the overall reaction.

(2)

$$C_2H_4 + 2Cl_2 \rightarrow C_2H_2Cl_2 + \text{.....}$$

(Total for question = 2 marks)

Q29.

Figure 16 shows the structure of a molecule of dichloroethene.

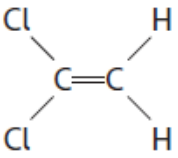


Figure 16

Dichloroethene is produced from ethene and chlorine.

In the overall reaction, ethene reacts with chlorine and forms dichloroethene and hydrogen chloride.

Complete the balanced equation for the overall reaction.

(2)

$$C_2H_4 + 2Cl_2 \rightarrow C_2H_2Cl_2 + \text{.....}$$

(Total for question = 2 marks)

Q30.

The structure of a molecule of ethene is shown in Figure 8.

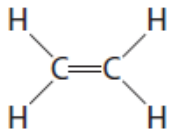


Figure 8

(i) Figure 9 shows the incomplete dot and cross diagram for a molecule of ethene.

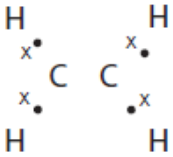


Figure 9

Complete Figure 9 to show the electrons of the C=C double bond.

(1)

(ii) The incomplete combustion of ethene in air produces water as one of the products.

Give the name of another product of the incomplete combustion of ethene.

(1)

.....

(Total for question = 2 marks)

Q31.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Ethanol is present in alcoholic drinks, such as wine.

When a bottle of wine is left open some of the ethanol reacts with the oxygen in the air to form ethanoic acid, CH_3COOH, and water.

(i) Complete the equation for this reaction.

(2)

$$CH_3CH_2OH + \text{.....} \rightarrow CH_3COOH + \text{.....}$$

(ii) Which calculation shows the percentage by mass of hydrogen in ethanoic acid?

(relative atomic mass of hydrogen, H = 1, relative formula mass of ethanoic acid, CH_3COOH = 60)

(1)

☒ **A** $\frac{1}{60} \times 100$

☒ **B** $\frac{3}{60} \times 100$

☒ **C** $\frac{4}{60} \times 100$

☒ **D** $\frac{60}{1} \times 100$

(Total for question = 3 marks)

Q32.

Ethanol, C_2H_5OH, can be converted into ethanoic acid, CH_3COOH.

(i) In this reaction ethanol is

(1)

☒ **A** hydrated

☒ **B** oxidised

☒ **C** polymerised

☒ **D** reduced

(ii) Draw the structure of a molecule of ethanoic acid, CH_3COOH, showing all covalent bonds.

(2)

(Total for question = 3 marks)

Q33.

Ethanol, C_2H_5OH, can be converted into ethanoic acid, CH_3COOH.

(i) In this reaction ethanol is

(1)

☒ **A** hydrated

☒ **B** oxidised

☒ **C** polymerised

☒ **D** reduced

(ii) Draw the structure of a molecule of ethanoic acid, CH_3COOH, showing all covalent bonds.

(2)

(Total for question = 3 marks)

Q34.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

(i) Figure 14 shows an incomplete diagram of the structure of a molecule of propanol, $CH_3CH_2CH_2OH$.

Complete the structure of the molecule of propanol in Figure 14.

(2)

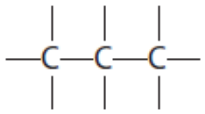


Figure 14

(ii) Propanol can be converted into propanoic acid.

What happens to propanol in this reaction?

(1)

☒ **A** it is dehydrated

☒ **B** it is neutralised

☒ **C** it is oxidised

☒ **D** it is polymerised

(Total for question = 3 marks)

Q35.

Polymer molecules can be made by joining together large numbers of small molecules called monomers.

Figure 5 shows the names and structures of some polymers and the monomers used to make them.

Complete the table using the information given.

(3)

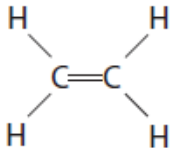
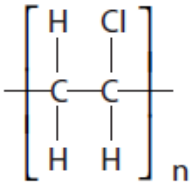
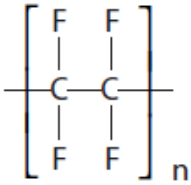
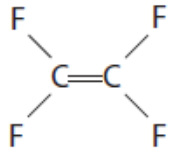
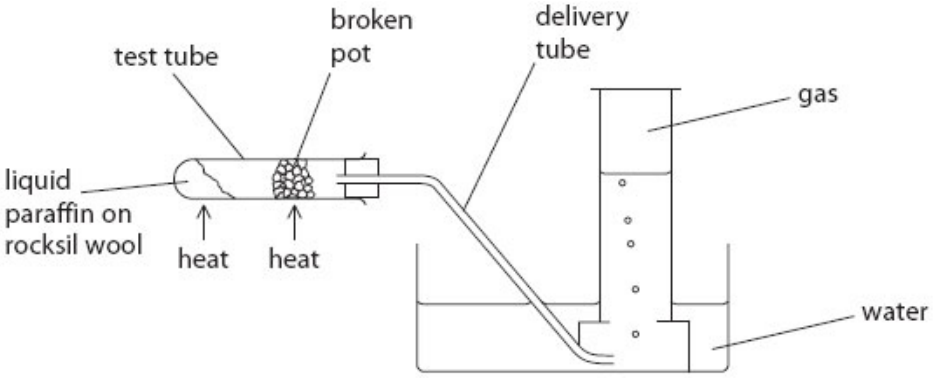
name of polymer	structure of polymer molecule	name of monomer	structure of monomer molecule
poly(ethene)		ethene	
poly(chloroethene)		chloroethene	
		tetrafluoroethene	

Figure 5

(Total for question = 3 marks)

Q36.

(a) In the laboratory this apparatus is used to crack long chain hydrocarbon molecules to form shorter chain hydrocarbon molecules.



When the experiment is complete there is a danger that water will rise up the delivery tube into the hot test tube.

State what you would do to prevent this.

(1)

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.....

(b) Complete the sentence by putting a cross (☒) in the box next to your answer.

The equation for a reaction that occurs during cracking is

$$C_{12}H_{26} \rightarrow C_2H_6 + C_6H_{12} + X$$

In the balanced equation, X is

(1)

☒ **A** C_3H_8

☒ **B** C_4H_8

☒ **C** C_4H_{10}

☒ **D** C_6H_{14}

(c) Alkenes are unsaturated hydrocarbons.

State what is meant by **unsaturated.**

(1)

.....

(d) Propane and propene are bubbled through separate samples of bromine water.

Describe what you would **see** in these tests.

(3)

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(e) In industry, long chain hydrocarbon molecules are cracked to form shorter chain hydrocarbon

molecules.

Explain why this process is important.

(2)

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(Total for Question = 8 marks)

Q37.

Ethene, C_2H_4, is an unsaturated hydrocarbon.

A different hydrocarbon has a relative formula mass of 84.
It has an empirical formula of CH_2.

Deduce the molecular formula of this hydrocarbon.

You must show your working.

(relative atomic masses : H=1, C=12)

(3)

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molecular formula = ...

(Total for question = 3 marks)

Q38.

Alkenes are unsaturated hydrocarbons.

State what is meant by **unsaturated.**

(1)

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Q39.

Nanoparticles are very small particles that have unusual properties.

(i) Particles less than 100 nanometres in size are classified as nanoparticles.

100 nanometres is

(1)

☒ **A** 1×10^{-4} metres

☒ **B** 1×10^{-5} metres

☒ **C** 1×10^{-7} metres

☒ **D** 1×10^{-9} metres

(ii) Nanoparticles of titanium(IV) oxide are used in some sunscreens.

Describe a reason why nanoparticles of titanium(IV) oxide are used in some sunscreens.

(2)

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(iii) Some people are concerned that there is a risk when sunscreens containing nanoparticles are used.

Explain a possible risk associated with using nanoparticles in sunscreens.

(2)

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(Total for question = 5 marks)

Q40.

Qualitative tests can be used to identify ions in substances.

Sodium hydroxide solution is warmed with a solution of ammonium ions. Ammonia gas is given off.

Describe the test to show the gas is ammonia.

(2)

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(Total for question = 2 marks)

Q41.

This question is about alcohols.

A student used an alcohol burner to find the mass of different alcohols needed to raise the temperature of 100 cm^3 of water by 20 °C.

Figure 15 shows their results.

alcohol	initial mass of alcohol burner and alcohol in g	final mass of alcohol burner and alcohol in g	mass of alcohol used in g
ethanol	122.51	122.02	0.49
propanol	168.55	168.13	0.42
butanol	152.62	152.23	
pentanol	67.22	66.86	0.36

Figure 15

(i) Calculate the mass of butanol used.

(1)

.....

mass of butanol = ... g

*(ii) Figure 16 shows equipment that can be used to obtain the results shown in Figure 15.

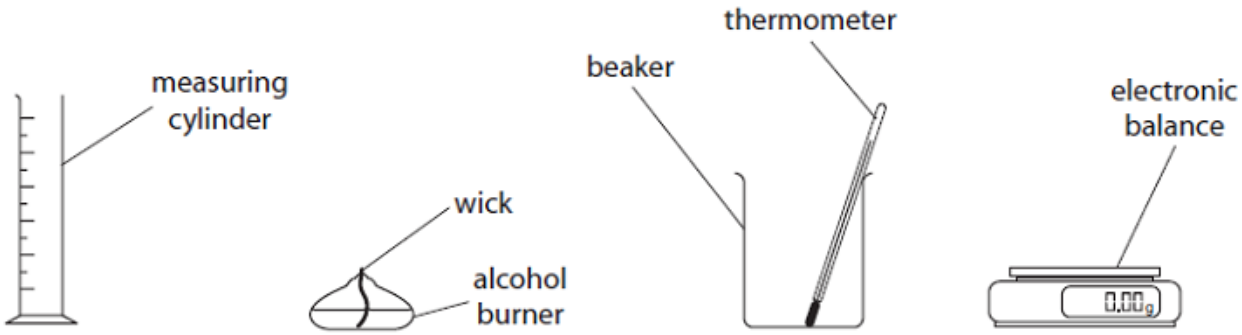


Figure 16

Describe an experiment, using the equipment in Figure 16, that could be used to obtain results like those shown in Figure 15.

(6)

(iii) The results show that 0.36 g of pentanol was needed to raise the temperature of the water by 20 °C.

Calculate the mass of pentanol needed to raise the temperature of water by 1 °C.

Give your answer to 2 decimal places.

Show your working.

(2)

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.....

mass of pentanol = ... g

(Total for question = 9 marks)

Q42.

Answer the questions with a cross in the boxes you think are correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Figure 16 shows the structure of a molecule of dichloroethene.

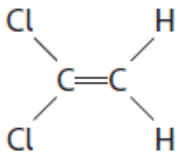


Figure 16

(i) Describe how dichloroethene monomers form a polymer.

(2)

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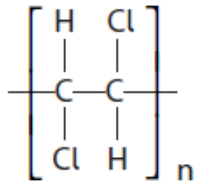
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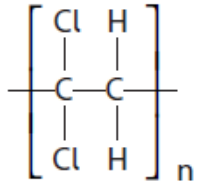
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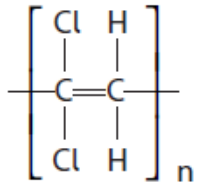
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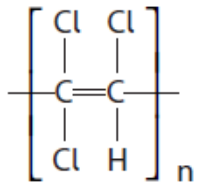
(ii) Which of these represents the structure of the polymer formed from the monomer in Figure 16?

(1)

☒ **A** 

☒ **B** 

☒ **C** 

☒ **D** 

(iii) Separate samples of dichloroethene and poly(dichloroethene) are shaken with a few drops of bromine water.

What would be **seen**?

(1)

☒ **A** both mixtures remain orange

☒ **B** only the dichloroethene and bromine water goes colourless

☒ **C** only the poly(dichloroethene) and bromine water goes colourless

☒ **D** both mixtures go colourless

(Total for question = 4 marks)

Q43.

Answer the questions with a cross in the boxes you think are correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Figure 2 shows the structure of a molecule of dichloroethene.

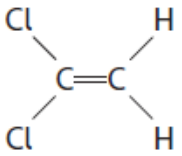


Figure 2

(i) Describe how dichloroethene monomers form a polymer.

(2)

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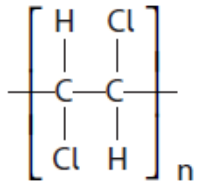
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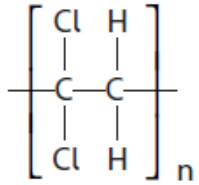
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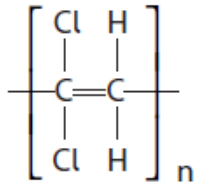
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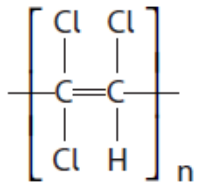
(ii) Which of these represents the structure of the polymer formed from the monomer in Figure 2?

(1)

☒ **A** 

☒ **B** 

☒ **C** 

☒ **D** 

(iii) Separate samples of dichloroethene and poly(dichloroethene) are shaken with a few drops of bromine water.

What would be **seen**?

(1)

☒ **A** both mixtures remain orange

☒ **B** only the dichloroethene and bromine water goes colourless

☒ **C** only the poly(dichloroethene) and bromine water goes colourless

☒ **D** both mixtures go colourless

(Total for question = 4 marks)

Q44.

Figure 10 shows a flask fitted with a cotton wool plug.
The flask contains an aqueous solution of a carbohydrate.

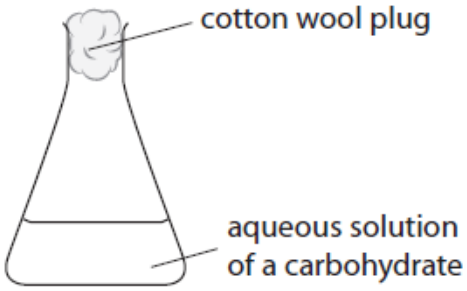


Figure 10

(i) State **two** steps that need to be taken to turn the solution of the carbohydrate in the flask into a solution of ethanol.

(2)

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2 .....

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(ii) The apparatus in Figure 11 is used to increase the concentration of the dilute solution of ethanol.

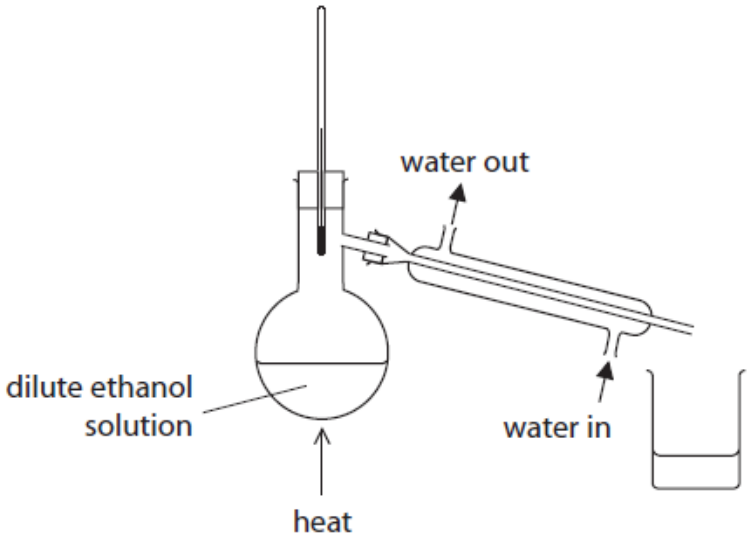


Figure 11

This apparatus did not produce a very concentrated solution of ethanol.

Describe how the apparatus can be altered to produce a more concentrated solution of ethanol.

(2)

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(Total for question = 4 marks)

Q45.

Tests are carried out to identify the ions in two solids, **P** and **Q**.

A flame test is used to identify the metal ions in each of these solids.

(i) Describe how to do a flame test.

(2)

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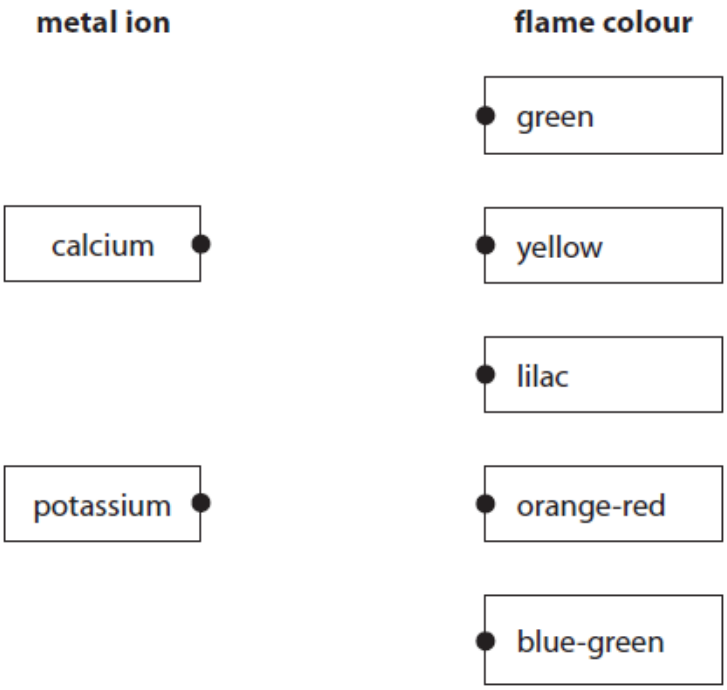
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(ii) Different metal ions produce different coloured flames.

Draw **one** straight line from each metal ion to its flame colour.

(2)



(Total for question = 4 marks)

Q46.

A sample of potassium carbonate is contaminated with a small amount of sodium carbonate. When a flame test is carried out on the sample, a bright yellow flame is seen.

Describe how you could show that potassium and sodium ions are present in this sample.

(2)

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(Total for question = 2 marks)

Q47.

(i) The apparatus in Figure 16 can be used to investigate the temperature rise produced in a known mass of water when a sample of ethanol is burned.

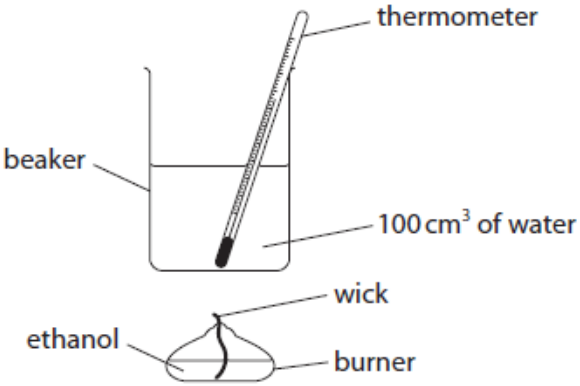


Figure 16

The first steps of the method are

1. put 100 cm^3 of water into a beaker
2. determine the mass of the burner containing ethanol
3. measure the initial temperature of the water
4. place the burner under the beaker of water
5. light the wick

Describe the remaining steps of the method that are needed to determine the mass of ethanol required to raise the temperature of the water by 30 °C.

(3)

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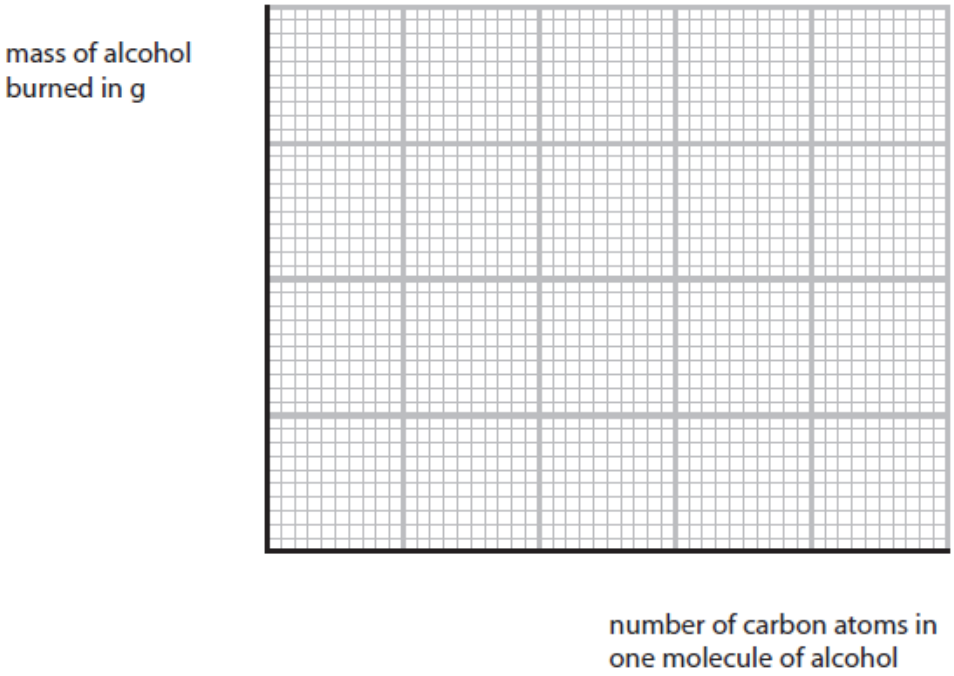
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(ii) In a different experiment, separate samples of the alcohols methanol, ethanol, propanol, butanol and pentanol were burned to determine the mass of each alcohol that needs to be burned to raise the temperature of 100 cm^3 water by 10 °C.

alcohol	number of carbon atoms in one molecule of alcohol	mass of alcohol burned in g
methanol	1	0.37
ethanol	2	0.28
propanol	3	0.25
butanol	4	0.23
pentanol	5	0.22

Draw a graph of the mass of each alcohol required to raise the temperature of 100 cm^3 of water by 10 °C against the number of carbon atoms in one molecule of that alcohol.

(3)



(Total for question = 6 marks)

Q48.

(i) The apparatus in Figure 3 can be used to investigate the temperature rise produced in a known mass of water when a sample of ethanol is burned.

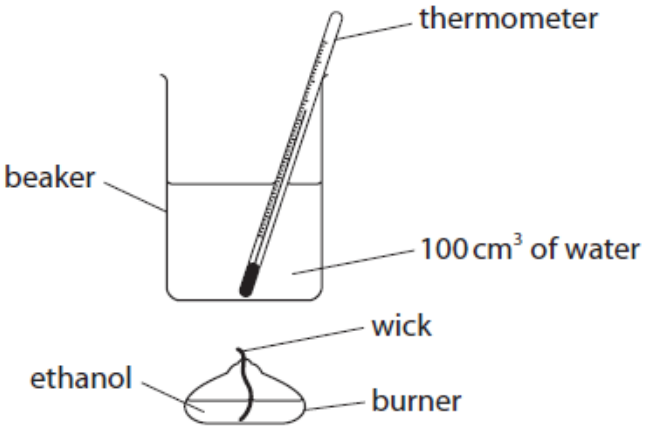


Figure 3

The first steps of the method are

1. put 100 cm^3 of water into a beaker
2. determine the mass of the burner containing ethanol
3. measure the initial temperature of the water
4. place the burner under the beaker of water
5. light the wick

Describe the remaining steps of the method that are needed to determine the mass of ethanol required to raise the temperature of the water by 30 °C.

(3)

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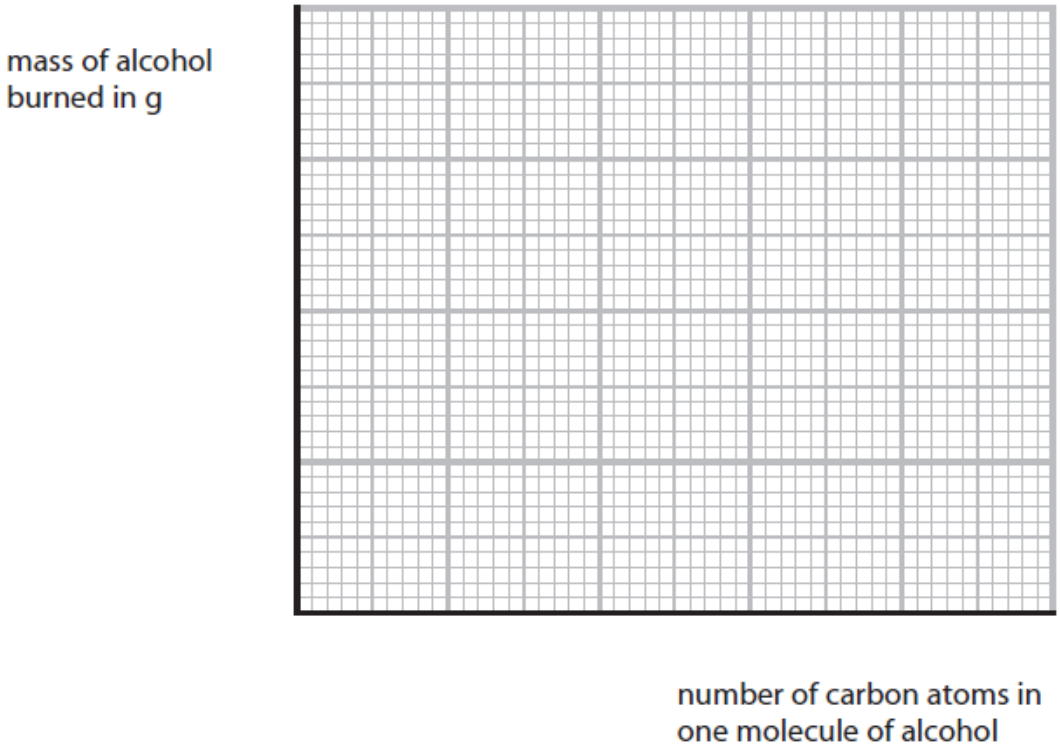
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(ii) In a different experiment, separate samples of the alcohols methanol, ethanol, propanol, butanol and pentanol were burned to determine the mass of each alcohol that needs to be burned to raise the temperature of 100 cm^3 water by 10 °C.

alcohol	number of carbon atoms in one molecule of alcohol	mass of alcohol burned in g
methanol	1	0.37
ethanol	2	0.28
propanol	3	0.25
butanol	4	0.23
pentanol	5	0.22

Draw a graph of the mass of each alcohol required to raise the temperature of 100 cm^3 of water by 10 °C against the number of carbon atoms in one molecule of that alcohol.

(3)



(Total for question = 6 marks)

Q49.

* A student was given a container of ammonium iron(II) sulfate, $(NH_4)_2Fe(SO_4)_2$.
The student was also given a dilute solution of sodium hydroxide and access to other laboratory reagents.

Describe the tests the student should carry out to identify the ions in the ammonium iron(II) sulfate, including appropriate equations for the reactions involved.

(6)

(Total for question = 6 marks)

Q50.

A white solid is known to be a chloride in which the metal ion is sodium, potassium, calcium or aluminium.

A chemist was told to carry out a test for each metal ion that could be present in this white solid.

Describe tests to show the presence of each of these metal ions.

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(Total for question = 6 marks)